

NISTTech

Chemical Modification of Substrates by Photo-Ablation in Different Local Atmospheres & Chemical Environments

A one-step method for fabricating a microfluidic system

Description

A laser is used to modify the charge on the surface(s) of a preformed polymeric microchannel (e.g. imprinted, embossed, injection molded, ablated, etc.). It is shown that the fluid flow induced by an electric field applied along the length of the channel increases in velocity in the regions that have been exposed to the laser, therefore indicating a change in the surface charge. Furthermore, the laser can be used to create well-defined spots within the channel that have a higher surface charge than the surrounding material. These spots have been shown to selectively bind proteins in a linear or 2-dimensional microarray pattern.

Applications

- **Development of lab-on-chip devices**

Advantages

- **Provides the ability to control the chemical functionality of a polymer surface during fabrication of microstructures**
- **Can produce content specific micro-vials**
- **Devices can be tailored to incorporate multiple features**
- **Not limited to a particular class of material**

Abstract

A method for simultaneously forming microstructures in substrates and altering their chemical character. The method involves exposing a surface portion of a substrate to light source, which is strong enough and of the appropriate wavelength to cause ablation of the substrate. The ablation of the substrate is controlled to form microstructures therein, such as channels. The ablation is conducted under a chemical atmosphere, which causes a change in the chemical functionality of the microstructures. The chemical atmosphere can be a gas, liquid or solid that is provided on the substrate surface. The method can be used to fabricate or modify microfluidic systems.

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References

- U.S. Patent # 6,703,189
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Status of Availability

This invention is available for licensing.

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